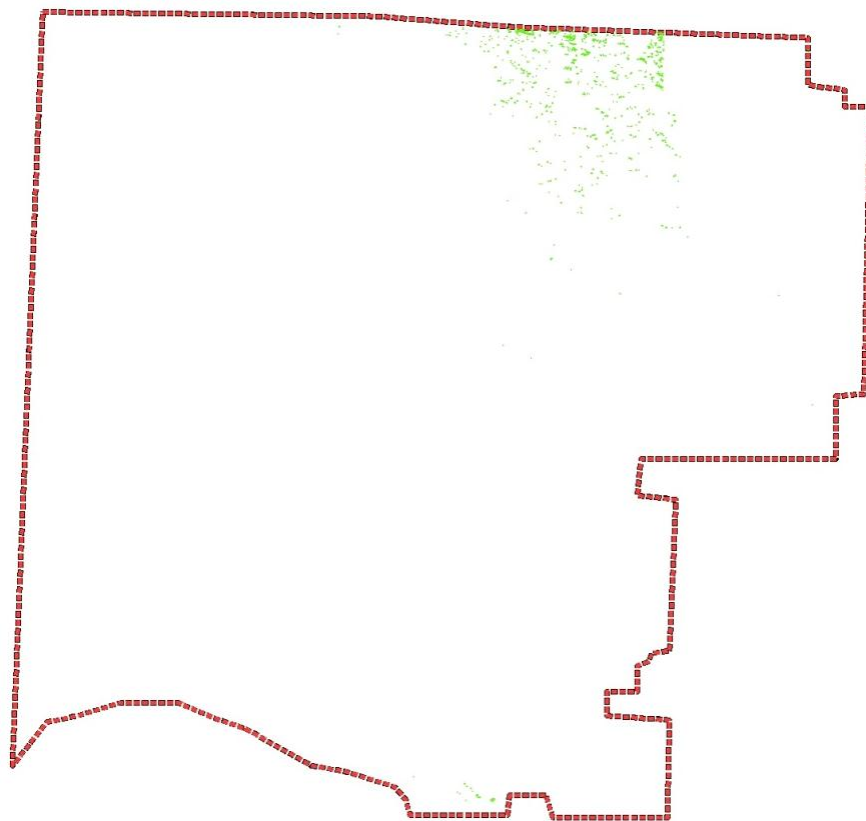


## OAK WOODLANDS

Oak woodland comprises less than one percent (2,432 acres) of the Farmington Field Office (FFO) (Map 1). Within the FFO, Gambel's oak (*Quercus gambelii*) comprise small dispersed clumps, typically found on mesic (moist) sites with deeper soils, usually as clones of shrubs in dense patches on northeast slopes Gambel's oak stands occur at elevations 6,500 feet and greater with the majority found along the New Mexico/Colorado state line and in the extreme northeast section of the field office. The two main upland shrub communities found on the FFO include the coniferous mixed woodland plant community and the montane coniferous forests. The coniferous mixed woodland plant community contains Colorado pinyon pine, Utah juniper, mountain mahogany, Gambel's oak, and ponderosa pine. Open stands in drier sites contain Colorado pinyon pine, Utah juniper, big sagebrush, buckwheat, and antelope bitterbrush. Grasses include: blue grama, western wheat grass, prairie Junegrass, mutton grass and galleta. The montane coniferous forest contains: Colorado pinyon pine, Rocky Mountain juniper, Douglas fir, and ponderosa pine. The shrub and grasses are dominated by antelope bitterbrush, mountain mahogany, Gambel's oak, mutton grass, prairie Junegrass, and western wheat grass. Lower elevations and lack of moisture contribute to lower densities of these particular species.



**Map 1. Gambel's oak plant community on BLM lands within the FFO area.**

**Table 1. Reclamation Goal for Gambel's Oak Community Cover**

<i>Functional Group</i>	<i>Percent (%) Foliar Cover</i>	<i>Common Species</i>
Trees/Shrubs/Grasses/Forbs	≥35	Gambel's oak, mountain mahogany, Utah serviceberry, antelope bitterbrush, western wheatgrass, Indian rice grass, galleta, mutton grass, scarlet globemallow, wooly Indian wheat, fleabane spp., penstemon spp., buckwheat, thread leaf groundsel
Invasive/undesirables <b>10% allowed toward meeting standard of 35%.</b>	≤10	Plants that have the potential to become a dominant species on a site where its presence is a detriment to revegetation efforts or the native plant community. Examples of invasive species include cheatgrass, Russian thistle, kochia.

**Table 2. Menu based seed mix by habitat type for mixed mountain shrub land, including oak brush (minimum requirement).\*\***

<i>Common Name</i>	<i>Scientific Names</i>	<i>Variety</i>	<i>Season</i>	<i>Form</i>	<i>PLS lbs/acre*</i>
<b>Plant two of the following:</b>					
Alder leaf mountain Mahogany	<i>Cercocarpus montanus</i>	VNS (Variety Not Specified)	Cool	Shrub	2.0
Utah serviceberry	<i>Amelanchier utahensis</i>	VNS	Cool	Shrub	2.0
Antelope bitterbrush	<i>Purshia tridentata</i>	VNS	Cool	Shrub	2.0
<b>and one of the following:</b>					
Slender wheatgrass	<i>Elymus trachycaulus</i> ,	VNS	Cool	Bunch	2.0
Western wheatgrass	<i>Pascopyrum smithii</i>	Arriba	Cool	Sod-forming	2.0
<b>and two of the following:</b>					
Prairie Junegrass	<i>Koeleria macrantha</i>	VNS	Cool	Bunch	4.0
Arizona fescue	<i>Festuca arizonica</i>	Redondo	Cool	Bunch	2.0
Mutton grass	<i>Poa fendleriana</i>	VNS	Cool	Bunch	4.0
<b>and one of the following:</b>					
Blue grama	<i>Bouteloua gracilis</i>	Alma or Hachita	Warm	Bunch	3.0
Indian rice grass	<i>Achnatherum hymenoides</i>	Paloma or Rimrock	Cool	Bunch	3.0

and two of the following:					
Sulphur Buckwheat	<i>Eriogonum umbellatum</i>	VNS	Warm	Forb	0.25
Scarlet Globemallow	<i>Sphaeralcea coccinea</i>	VNS	Warm	Forb	0.25
Utah Sweetvetch	<i>Hedysarum boreale</i>	VNS	Warm	Forb	0.25
Small Burnet	<i>Sanguisorba minor</i>	Delar	Cool	Forb	2.0

**\*\*Based on 60 pure live seeds (PLS) per square foot, drill seeded. Double this rate (120 PLS per square foot) if broadcast or hydroseeded.**



**Photo 1. Gambel's oak interspersed with Pinyon-Juniper woodlands**



**Photo 2. Gambel's oak interspersed with Pinyon-Juniper woodlands**

## RECOMMENDATION FOR EFFECTIVE RECLAMATION

**Recommendations:** Provided below are some procedures and methods that may to help achieve more effective reclamation success.

Soil Testing: Development of a soil testing plan for evaluation of the results of topsoil handling and reclamation procedures related to revegetation may prove beneficial. Suggested soil testing may include some or all of the following: pH, electrical conductivity (EC), texture, topsoil depth and overall soil depth, carbonates (reactivity), organic matter (OM), Sodium Absorption Ratio (SAR).

Topsoil Stripping, Storage, and Replacement: At a minimum, the upper six (6) inches of topsoil should be stripped, following the removal of vegetation during construction of well pads, pipelines, roads, or other surface facilities. The stripped topsoil should be stored separately from subsoil or other excavated material and replaced prior to final seedbed preparation. Topsoil should not be used for blow pits or flaring areas.

Seedbed Preparation: For cut-and-fill slopes, initial seedbed preparation should consist of backfilling and recontouring to achieve the configuration specified in the reclamation plan. Seedbed preparation for compacted areas should be ripped to a minimum depth of eighteen (18) inches, with a maximum furrow spacing of two (2) feet. Where practicable, ripping should be conducted in two passes at perpendicular directions. **Avoid leaving large clumps or clods.** If this exists, disking should be conducted. Disking and seed drills should run perpendicular to slopes to provide terracing and prevent rapid runoff and erosion.

**Seedbed preparation is one of the most important steps for reclamation success.** Following final contouring, the backfilled or ripped surfaces should be covered evenly with topsoil. Final seedbed preparation should consist of raking or harrowing the spread topsoil prior to seeding to promote a firm seedbed. **A loose seedbed makes it impossible to control the depth of seeding because the tires and the planter sink into the soil.** Seedbed preparation may not be necessary for topsoil storage piles or other areas of temporary seeding.

Planting Depth: **Improper planting depth, particularly the planting of some species too deeply, in “fluffy” soils, is one of the major impediments to reseeding success.** The Truax seed drill or modified rangeland drills that allows for seeding species from different seed boxes at different planting depths has been used by other BLM offices to address this issue. Efforts should be taken to ensure that perennial grasses and shrubs are planted at the appropriate depth. Intermediate size seeds such as wheatgrasses and shrubs should be planted at a depth of 0.5 inches, larger seeds such as Indian ricegrass at 1 to 2 inches, and small seeds such as alkali sacaton, and sand dropseed should be planted at a depth of 0.25 inches. In situations where differing planting depths are not practicable with the equipment being used, the entire mix should be planted no deeper than 0.25 inch. Planting too shallow is generally better than planting too deep. **A review of current research methods is recommended (e.g., USDA PLANTS, USDA Plant Materials Centers, Native Seed Companies).**



Soil Amendments: Amending a soil is not the same thing as mulching, although many types of mulch also are used as amendments. A "soil amendment" is any material added to a soil to improve its physical properties, such as water retention, permeability, water infiltration, drainage, aeration, nutrition and structure. Organic amendments include sphagnum peat, humate, wood chips, grass clippings, straw, compost, manure, biosolids, sawdust and wood ash. Inorganic amendments include vermiculite, perlite, lime, gypsum, tire chunks, pea gravel and sand.

Mulching: Mulch may increase the success of seed germination and provide protection against erosion. Mulch should be applied within 24 hours following completion of seeding. In areas of interim reclamation that used drill-seeding or broadcast-seeding/raking, mulch shall consist of crimping certified weed-free straw or certified weed-free native grass hay into the soil. Hydromulching may be used in areas of interim reclamation where crimping is impracticable, in areas of interim reclamation that were hydroseeded, and in areas of temporary seeding regardless of seeding method. Mulch applications in extremely clayey soils should be evaluated carefully to avoid developing an adobe mixture. In these cases, a soil amendment may prove more beneficial.

Timing of Seeding: Precipitation is the principal input controlling biological processes in arid and semiarid regions. The pattern of soil moisture will have a great impact on the fate of seeding. Many grasses species will germinate following significant moisture events that allow for deeper infiltration of soil moisture (4-12 inches deep). This moisture generally persists for several weeks and is available for seedling root growth and establishment.

Grass species belong to one of two basic physiological types; cool season or warm season. Cool season grasses have optimum growth temperatures of 70-75°F with growth halting at around 40°F. Warm season optimum temperatures occur at 85-95°F and growth ceasing at about 55°F. The best time for seeding grass is at the beginning of the growing season. For cool season grasses, there are two growing cycles: FALL and SPRING. The best time to plant cool season grasses is in late summer or early fall. For warm season grasses, there is 1 growing season: SUMMER. The best time plant warm season grass species is early spring or summer, with the onset of the monsoons, typically beginning in early to mid-July.

The paragraph above provides the optimal timings of seeding for cool and warm season species which make up the seed mixes for of the eight desired plant communities for reclaiming disturbed areas. Experience in Farmington Field Office has shown with adequate winter moisture seeds planted in the late fall or early winter (before the ground is frozen), that cool season species will germinate the following spring, setting the stage for germination of warm season species in the mix later in the season.

Additional Seeding Rates or Species: While minimum seed requirements have been provided by the BLM, it does not exclude proposals for increased seeding rates or additional species/varieties of plants to BLM for approval to achieve reclamation standards. Industry attaining an understanding of soil types, precipitation patterns, the climate, and vegetation/environment relationships could be very valuable.

Sterile Cover Crop Option: Sterile cover crops can be useful in temporary site stabilization in the case where bare soil is exposed. It also can be used with the perennial mix in reclamation for a non-persistent “nurse” crop. A nurse crop is an annual crop used to assist in establishment of a perennial crop. Nurse crops reduce the incidence of weeds, prevent erosion, and shelter tender seedlings from sun and wind.

Other advantages are:

- Sterile annual plant; rapid germination (sprout rapidly, establish quickly)
- Plant will not persist past one growing season
- Cold tolerant, able to grow under cool conditions
- Larger root mass and more efficient use of soil nutrients than wheat; holds soil and builds soil organic matter
- Superior tolerance to disease, salt, and drought compared to wheat
- Able to adapt to a wide range of soil and moisture conditions
- Adapts either fall or spring plantings; has fair to excellent winter survival

Common Name	Scientific Names	Variety	Season	Form	PLS lbs/acre*
Sterile Cover Crop	<i>Triticum aestivum</i> X <i>Secale cereale</i>	Quickguard or similar sterile hybrid var.	Cool	Grass	7-10

**\*Based on 60 pure live seeds (PLS) per square foot, drill seeded. Double this rate (120 PLS per square foot) if broadcast or hydroseeded. Can be mixed with the perennial mix and seeded at the same time.**

BLM Consultation: BLM is available provide consultations concerning fencing options to help minimize industry costs, should fencing be necessary to achieve reclamation success.